

____ BONDED-CONCRETE FLOOR FINISH

a. General. - A bonded-concrete finish shall be applied to concrete floors in the _____ where shown on the drawings. The Contractor shall furnish all materials for the bonded-concrete finish, including cement, water, sand, coarse aggregate, air-entraining agents, fluosilicate crystals, and waterproof paper. The bonded-concrete finish shall not be placed in the generator room until after the installation of all machinery and equipment in the generator room has been completed. All other bonded-concrete finish shall be applied before or after the installation of the machinery and equipment has been completed ¹(at the Contractor's option.) (as directed.) All bonded-concrete finish shall be placed to the thicknesses shown on the drawings, except that the finished surfaces shall be sloped where and as required for drainage.

b. Materials. -

(1) Cement. - ¹[Cement shall conform to applicable requirements of paragraph ____ (Cement).] (Cement shall be in accordance with Federal Specification SS-C-192a, type II, low alkali, and shall meet the false-set limitation specified therein modified as follows: The final penetration of the needle 5 minutes after completion of mixing shall be not less than the initial penetration minus 17 millimeters.

Cement will be accepted on manufacturer's certificate of compliance accompanied by mill test report. The cement shall be free from lumps and damaged cement when used in the work.)

(2) Water. - Water shall be free from objectionable quantities of salt, organic matter, alkalis, salts, and other impurities.

(3) Sand and coarse aggregate. - ¹(Sand and coarse aggregate for bonded-concrete floor finish shall conform to the applicable requirements of paragraphs ____ (Sand) and ____ (Coarse Aggregate), except that the maximum size of coarse aggregate shall be one-half inch, and not more than 10 percent of the coarse aggregate shall pass a screen having 3/16-inch square openings.)

¹(The sand particles shall be hard, dense, durable, uncoated rock fragments that will pass a screen having 3/16- or 1/4-inch square openings. The sand shall be well-graded from fine to coarse and shall be free from injurious amounts of dirt, organic matter, and other deleterious substances. The coarse aggregate shall consist of hard, dense, durable, uncoated rock fragments; shall be free from injurious amounts of thin pieces, organic matter, and other deleterious substances; and shall be reasonably well-graded from 3/16 to 1/2 inch. Not more than 10 percent of the coarse aggregate shall pass a screen having 3/16-inch square openings. The Government reserves the right to test the sand and coarse aggregate; and if required, the Contractor shall submit, for preliminary tests and approval, representative samples of the sand and coarse aggregate proposed for use in the work.)

(4) Air-entraining agent. - ¹(Air-entraining agent for bonded concrete finish shall conform to applicable requirements of paragraph ____ (Admixtures), except that the percentage of air to be entrained shall conform to the requirements hereinafter specified.) ¹(ASTM designation: C 260-54.)

(5) Fluosilicate crystals. - Fluosilicate crystals for liquid hardener shall be magnesium fluosilicate or zinc fluosilicate or a combination of both.

c. Preparation of base. - The surfaces of the concrete base to which the finish is to be bonded shall be clean and rough when the finish is applied. The surfaces shall be cleaned and roughened by blasting with steel grit or shot, aluminum oxide, silicon carbide, or other effective abrasive; or by routing and roughening using equipment designed for the purpose of cutting hardened concrete surfaces. The blasting equipment shall be provided with a vacuum system which will collect the blasting media and refuse from the surface being cleaned without allowing dust to escape into the surrounding atmosphere. The vacuum system shall be provided with dust collectors and shall discharge clean air. If routing and roughening equipment is used, the results obtained shall be equivalent in freshness and cleanness to a chipped or sandblasted surface; the surrounding atmosphere shall not become laden with moist or dry grit during preparation of the base, and there shall be no scattering of debris. The method and equipment used in the preparation of the base shall be subject to the approval of the Contracting Officer.

d. Proportioning and mixing. - Bonded-concrete finish for floors ¹(including landings and stair treads) shall be mixed in the proportion of 1 part of portland cement to 1 part of sand and 1-3/4 to 2-1/4 parts of coarse aggregate, by weight, of the dry materials; ¹(and the bonded concrete finish for stair risers shall be mixed in the proportion of 1 part of portland cement to 2-1/2 parts of sand, by weight, of the dry materials.) The exact proportion of coarse aggregate to be used shall be determined by the Contracting Officer.

The finish mix shall contain sufficient air-entraining agent to entrain 2 percent plus or minus 1 percent of air, by volume of concrete, as discharged from the mixer. All batches for bonded-concrete finish shall be proportioned on the basis of integral sacks of cement unless the cement is weighed. The amounts of sand and each size of coarse aggregate entering each batch of concrete shall be determined by weighing or volumetric measurement. Weighing equipment of the beam type may be used. Batching equipment shall be operated so that the combined inaccuracies in feeding and measuring the materials will not exceed 1-1/2 percent for water or weighed cement and 2 percent for each size of aggregate.

The consistency of the concrete shall be such as will permit power floating immediately after the tamping hereinafter specified has been completed and such as will allow sufficient mortar to be drawn to the surface during the floating operation to permit proper finishing of the surface. Concrete which will stick together on being molded into a ball by slight pressure of the hands and which will not exude free water when so pressed but which will leave the hands damp will, in general, meet the requirements of these specifications. A net water-cement ratio of the concrete (exclusive of water absorbed by the aggregates) of 0.36, by

weight, shall not at any time be exceeded for the floor finish. The concrete ingredients shall be mixed in a batch mixer for not less than 2 minutes after all of the ingredients, except the full amount of water, are in the mixer. The Government reserves the right to increase the mixing time when the charging and mixing operations fail to produce a concrete batch throughout which the ingredients are uniformly distributed and the consistency is uniform.

e. Placing and finishing. - The surface of concrete base slab to which floor finish is to be bonded shall be kept thoroughly wet for 24 hours prior to placing the floor finish, but no free water shall be applied to or allowed to remain on the surface within 30 minutes of the time when the floor finish is to be placed. Floor finish shall not be placed when the temperature of the base slab is less than 50 EF. Before floor finish is placed, a limited area of base slab shall be treated by thorough scrubbing with just sufficient mortar to cover the area completely with a coating having an average thickness of approximately 1/16 of an inch.

The area to be treated shall be sufficiently small to permit spreading, tamping, and screeding of floor finish before the mortar stiffens appreciably. The mortar shall be mixed in the proportions of 1 part, by weight, of cement to 1 part, by weight, of sand. A sufficient quantity of water shall be used to produce a slump of approximately 8 inches. The scrubbing shall be performed with stiff-bristled brushes.

The floor finish shall be spread evenly to a level slightly above grade and compacted thoroughly by tamping. Tampers shall be sufficiently heavy for thorough compaction. After being screeded, the floor finish shall be compacted further and smoothed with an approved type of motordriven float so as to bring sufficient mortar to the surface for finishing. The surface shall be tested with a straightedge, and any high or low spots shall be eliminated.

Floating shall be followed by steel troweling as soon as the floor finish has hardened sufficiently to prevent bringing excess fine material to the surface by the troweling operation. Water, cement, or a mixture of dry cement and sand shall not be sprinkled on the surface of the floor finish. Troweling shall be performed at the proper time and with heavy pressure, and shall be such as will result in a smooth, dense finish which is free from defects and blemishes. As the concrete continues to harden, the surface shall be given additional trowelings. The final troweling shall be performed after the surface has hardened to such an extent that no cement paste will adhere to the edge of the trowel. Excessive troweling will not be permitted. The number of trowelings, the time at which trowelings are performed, and the quality of the final finished surface shall be subject to the approval of the Contracting Officer.

f. Curing and protection. - The Contractor shall protect all bonded concrete floor finish from damage. In freezing weather, suitable means shall be provided for maintaining the concrete floor finish at a temperature of at least 50 EF for not less than 72 hours after it is placed or until the concrete floor finish has hardened thoroughly. All concrete floor finish shall be protected from freezing for not less than 2 weeks by such means as are approved by the Contracting Officer.

Where artificial heat is employed, special care shall be taken to keep the concrete from drying. As soon as the completed floor finish has hardened sufficiently to prevent damage, the surface shall be moistened by being sprayed lightly with water and then covered completely with a waterproof covering of paper, or shall be covered by ponding or by covering with a layer of wet sand. Waterproof paper, if used, shall be an effective, airtight, nonstaining, waterproof covering which will prevent loss of moisture from the concrete by evaporation. Edges of the paper shall be lapped and sealed. The paper, water, or wet sand shall be left in place for not less than 2 weeks. If a waterproof covering of paper is used and the floor is to be subjected to any usage during the curing period that might rupture or otherwise damage the covering, the covering shall be protected by a suitable layer of sand, or other cushioning material approved by the Contracting Officer. After the curing has been accomplished, the covering and all foreign materials shall be removed and disposed of as directed.

g. Applying liquid floor hardener. - Three coats of liquid floor hardener shall be applied to the bonded-concrete floor finish in a manner approved by the Contracting Officer. After the bonded-concrete floor finish has been cured thoroughly and at such time as directed by the Contracting Officer, the surface shall be cleaned thoroughly of all dirt, grease, laitance, or other foreign matter and shall be allowed to dry, immediately after which the floor hardener shall be applied.

For the first coat, the Contractor shall prepare the hardener solution by dissolving fluosilicate crystals in the proportion of 1 pound of crystals per gallon of water. For each subsequent coat, 2 pounds of crystals to each gallon of water shall be used. The solution shall be applied liberally by means of floor mops, and each coat shall be allowed to dry thoroughly before another is applied. Each coat shall be spread uniformly, and the presence of pools of the hardener solution shall be avoided. After the last coat has dried, the floor shall be brushed and washed with water to remove any crystals which may have formed on the surface.

h. Measurement and payment. - Measurement for payment for bondedconcrete floor finish will be made to the neatlines of the areas required to be covered with bonded-concrete floor finish, and the areas of all openings will be deducted. Payment for bonded-concrete floor finish will be made at the unit price per square yard bid therefor in the schedule, which unit price shall include the cost of preparing the base; of furnishing all materials ¹(except cement) and of applying the liquid floor hardener. ¹(Payment for furnishing and handling cement will be made at the unit price per barrel bid therefor in the schedule.)

¹Delete as required.